THE CLAIMS

What Is Claimed Is:

1. A solid-phase porous sorbent material having an average pore diameter, wherein said solid-phase porous sorbent material comprises sorbent particles having at least one interior channel therein, and wherein said interior channel has an average transverse dimension at least one order of magnitude (10x) larger than said average pore diameter of said solid-phase porous sorbent material.

2. The solid-phase porous sorbent material of claim 1, wherein said interior channels have an average diameter at least two orders of magnitude (100x) larger than the average pore diameter of said solid-phase porous sorbent material.

3. The solid-phase porous sorbent material of claim 1, wherein said interior channels have an average diameter at least three orders of magnitude (1000x) larger than the average pore diameter of said solid-phase porous sorbent material.

4. The solid-phase porous sorbent material of claim 1, wherein said interior channels have an average diameter at least four orders of magnitude (10000x) larger than the average pore diameter of said solid-phase porous sorbent material.

5. The solid-phase porous sorbent material of claim 1, having an average pore diameter in the range from about 2 Å to about 200 Å.

6. The solid-phase porous sorbent material of claim 1, having an average pore diameter in the range from about 2 Å to about 100 Å.

7. The solid-phase porous sorbent material of claim 1, wherein the sorbent particles have a conformation selected from the group consisting of beads, cylinders, granules, flakes, platelets, pellets, tablets, sheets, rods, helixes, extrudates, cloth, curviform, web form materials, honeycomb matrix monolith, and comminuted and crushed forms of said conformations.

8. The solid-phase porous sorbent material of claim 1, comprising a material selected from the group consisting of silica, carbon molecular sieves, alumina, macroreticulate polymers, kieselguhr, carbon, and aluminosilicates.

9. The solid-phase porous sorbent material of claim 1, comprising activated carbon material.

10. The solid-phase porous sorbent material of claim 1, comprising a bead activated carbon material.

11. The solid-phase porous sorbent material of claim 10, wherein said bead activated carbon material has an average particle diameter in the range from about 0.1 millimeter to about 3 centimeters.

12. The solid-phase porous sorbent material of claim 10, wherein said bead activated carbon material has an average particle diameter in the range from about 1 millimeter to about 1 centimeter.

13. The solid-phase porous sorbent material of claim 10, wherein said bead activated carbon material has an average particle diameter in the range from about 3 millimeters to about 6 millimeters.

14. The solid-phase porous sorbent material of claim 1, comprising carbon molecular sieves having a cylindrical extruded shape, characterized by an average length in the range from about 8 millimeters to about 10 millimeters and an average diameter in the range from about 2 millimeters to about 4 millimeters.

15. The solid-phase porous sorbent material of claim 1, wherein the interior channels of said porous sorbent particles are cylindrical bores through said sorbent particles.

16. The solid-phase porous sorbent material of claim 1, wherein each of said sorbent particles comprises a single cylindrical through-bore channel.

17. The solid-phase porous sorbent material of claim 1, wherein each of said sorbent particles comprises an array of interior channels.

18. An adsorption-desorption apparatus, for storage and dispensing of a sorbable fluid, said apparatus comprising:

(a) a storage and dispensing vessel constructed and arranged for holding a solid-phase porous sorbent material, and for selectively flowing fluid in and out of said vessel;

(b) a channelized solid-phase porous sorbent material, disposed in said storage and dispensing vessel at an interior gas pressure, wherein said solid-phase porous sorbent material has an average pore diameter and comprises sorbent particles having at least one interior channel, and wherein said interior channel has an average transverse dimension at least one order of magnitude (10x) larger than the average pore diameter of said solid-phase porous sorbent material;

(c) a sorbable fluid adsorbed on said solid-phase porous sorbent material; and

(d) a dispensing assembly coupled in gas flow communication with the storage and dispensing vessel.

19. The adsorption-desorption apparatus of claim 18, wherein the dispensing assembly is constructed and arranged:

(i) to provide, exteriorly of said storage and dispensing vessel, a pressure below said interior pressure, to effect desorption of sorbable fluid from the solid-phase porous sorbent material and flow of desorbed fluid through the dispensing assembly; and/or

(ii) to flow thermally desorbed fluid therethrough, wherein said dispensing assembly comprises means for heating the solid-phase porous sorbent material to effect thermal desorption of the fluid therefrom, so that the desorbed fluid flows from the vessel into the dispensing assembly.

20. The adsorption-desorption apparatus of claim 18, wherein the sorbent particles of the solid-phase porous sorbent material have a conformation selected from the group consisting of beads, cylinders, granules, flakes, platelets, pellets, tablets, sheets, rods, helixes, extrudates, cloth, curviform, web form materials, honeycomb matrix monolith, and comminuted and crushed forms of said conformations.

21. The adsorption-desorption apparatus of claim 18, wherein the solid-phase porous sorbent material comprises a material selected from the group consisting of silica, carbon molecular sieves, alumina, macroreticulate polymers, kieselguhr, carbon, and aluminosilicates.

22. The adsorption-desorption apparatus of claim 18, wherein the solid-phase porous sorbent material comprises activated carbon material.

23. The adsorption-desorption apparatus of claim 18, wherein the solid-phase porous sorbent material comprises a bead activated carbon material.

24. A method of forming a solid-phase porous sorbent material of claim 9, comprising the step of:

(a) providing a pyrolyzable carbonaceous resin;

(b) coating said pyrolyzable carbonaceous resin over channel core bodies of a solid core material to form resin particles having coated cores, wherein said solid core material is insoluble in said pyrolyzable carbonaceous resin but is removable from said resin;

(c) removing said channel core bodies from the resin particles, leaving interior channels in said resin particles; and

(d) pyrolyzing the channelized resin particles to convert such into channelized activated carbon particles.

25. The method of claim 24, wherein the pyrolyzable carbonaceous resin is selected from the group consisting of polyacrylontrile, furfuryl alcohol, resorcinol, phenol, catechol, and phloroglucinol.

26. The method of claim 25, wherein the pyrolyzable carbonaceous resin comprises polyacrylontrile.

27. The method of claim 24, wherein the solid core material comprises a volatilizable material selected from the group consisting of ammonium salts, copper acetylacetone, hexachloroethane, potassium amide, ferrous chloride, wax, and camphor.

28. The method of claim 24, wherein the solid core material comprises ammonium carbonate.

29. The method of claim 24, wherein the solid core material comprises a meltable material.

30. The method of claim 24, wherein the solid core material comprises a soluble material.

31. The method of claim 24, wherein the solid core material comprises an etchable material.

32. The method of claim 24, wherein the channel core bodies of said solid core material have a conformation selected from the group consisting of cylinders, rods, dendrites, granules, flakes, helixes, and combinations thereof.

33. A channelized sorbent material having an average pore diameter, wherein said channelized sorbent material comprises sorbent particles having one or more interior channels, and wherein said interior channels have a transverse diameter at least one order of magnitude (10x) larger than the average pore diameter of said channelized sorbent material.

34. A method for forming the channelized sorbent material of claim 33, comprising the steps of providing a sorbent precursor material, coating such sorbent precursor material around removable solid core bodies to form sorbent precursor particles, removing the removable solid core bodies to produce channelized sorbent precursor particles, and converting the channelized sorbent precursor particles into channelized sorbent particles.